Sistema de Numeração e Códigos

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Sistema de Numeração Decimal

- Dígitos com algarísmos: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

- Ex: $486_{10} = 400 + 80 + 6$

  $= 4x100 + 8x10 + 6x1$

  $= 4x10^2 + 8x10^1 + 6x10^0$

- Forma genérica

- $D = d_{m-1}x10^{m-1} + d_{m-2}x10^{m-2} + ... + d_1x10^1 + d_0x10^0$

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Sistema de Numeração Genérica

- Forma genérica
- $D = d_{m-1} x r^{m-1} + d_{m-2} x r^{m-2} + \ldots + d_1 x r^1 + d_0 x r^0$

$$D = \sum_{i=-n}^{m-1} d_i \times r^i$$

LSB (dígito menos significativo) Ex: 13496
MSB (dígito mais significativo)

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Sistema de Numeração Binária

- Dígitos com algarísmos: 0, 1

$$B = b_{m-1}x2^{m-1} + b_{m-1}x2^{m-2} +...+ b_1x2^1 + b_0x2^0$$

$$B = \sum_{i=-n}^{m-1} d_i \times 2^i$$

Sistema de Numeração Binária

- Ex:

$$10101 = 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$= 1 \times 16 + 0 \times 8 + 1 \times 4 + 0 \times 2 + 1 \times 1$$

$$= 21_{10}$$

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Sistema de Numeração Octal

- Dígitos com algarísmos: 0, 1, 2, 3, 4, 5, 6, 7

Ex:

$$37_8 = 3 \times 8^1 + 7 \times 8^0 = 24 + 7 = 31_{10}$$

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Sistema de Numeração Hexadecimal

- Dígitos com algarísmos:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

10 11 12 13 14 15

Ex:

$$1AE_H = 1 \times 16^2 + 10 \times 16^1 + 14 \times 16^0 =$$

$$= 256 + 160 + 14 = 430_{10}$$

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Conversão entre Bases

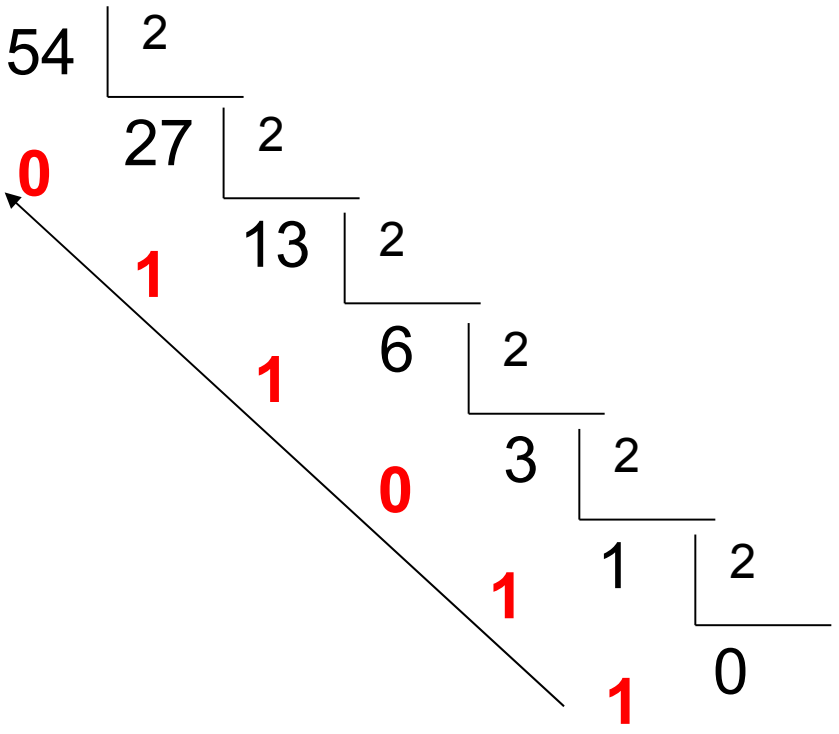
- Binário, Octal e Hexadecimal para Decimal:

$$K = \sum_{i=-n}^{m-1} k_i \times r^i$$

Decimal para Binário, Octal e Hexadecimal :

MÉTODO DAS DIVISÕES SUCESSIVAS

Ex: $54_{10} = 110110_2$



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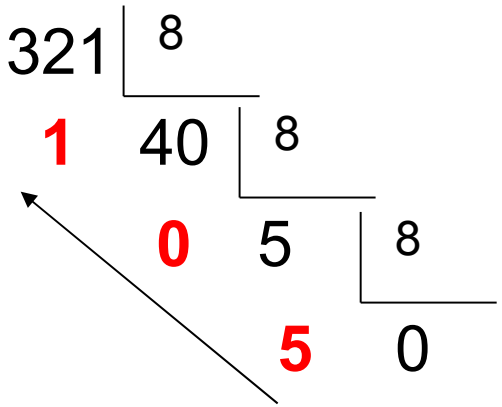
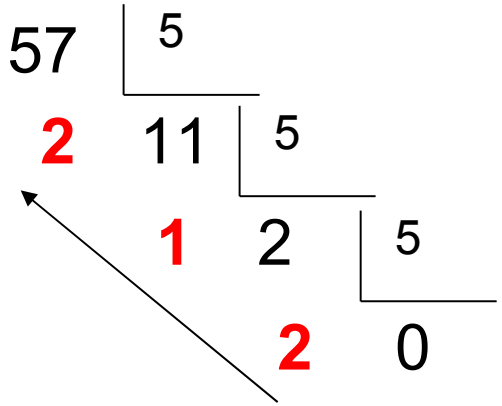
Conversão entre Bases

Ex: $321_{10} = 501_{8}$



Ex: $57_{10} = 212_{5}$



Conversão entre Bases

- Binário <-> Octal <-> Hexadecimal
- Método da Codificação

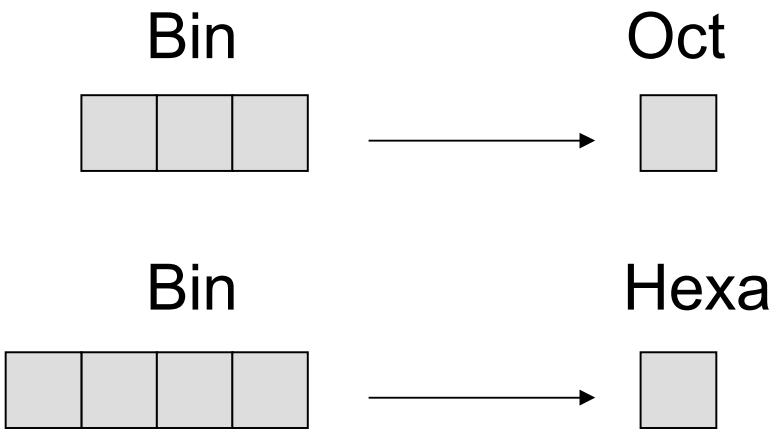
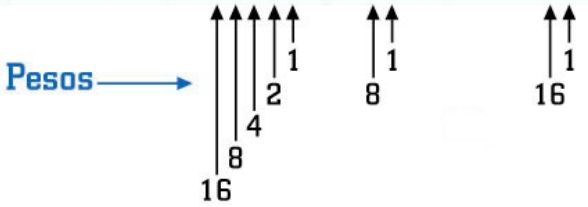


Tabela 1.1

Decimal	Binário	Octal	Hexadecimal
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F
16	10000	20	10
17	10001	21	11
18	10010	22	12
19	10011	23	13
20	10100	24	14



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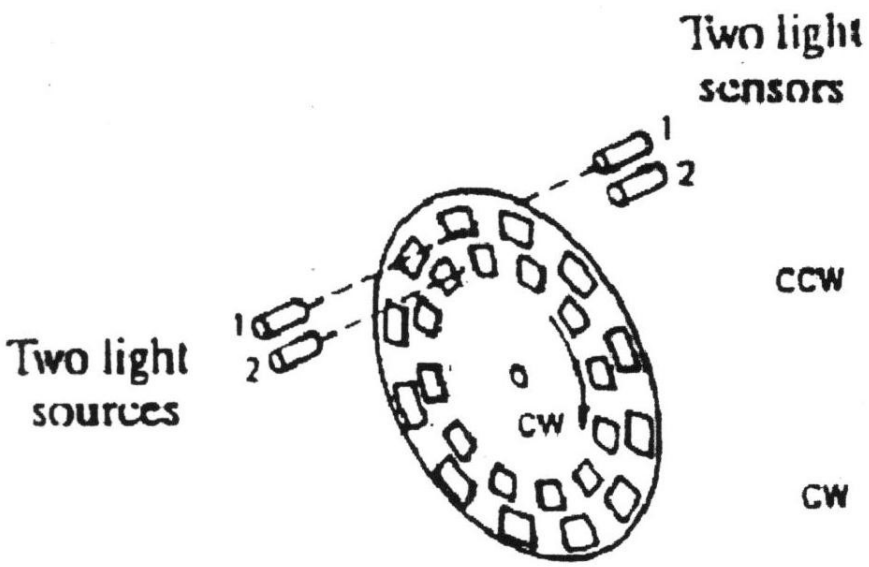
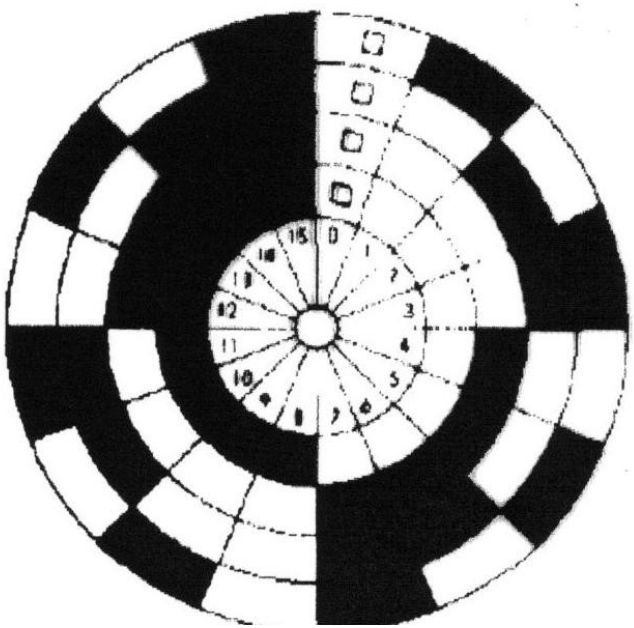
Códigos Especiais

- Código Gray
- Encoders Absolutos

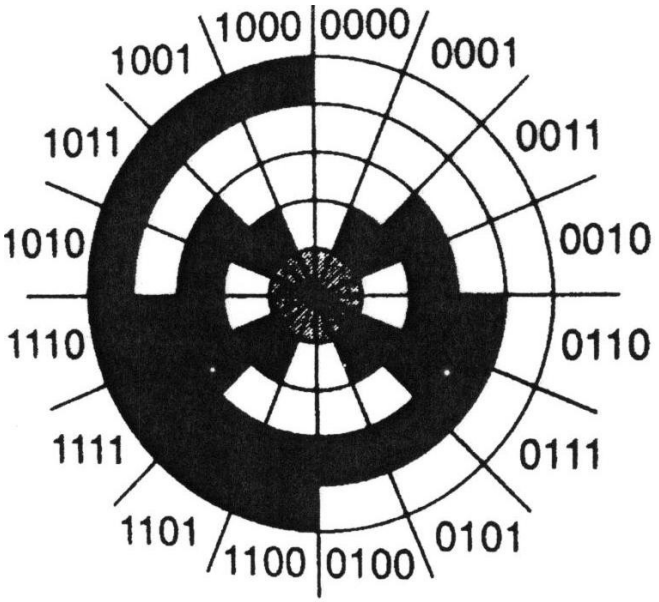




Códigos Especiais

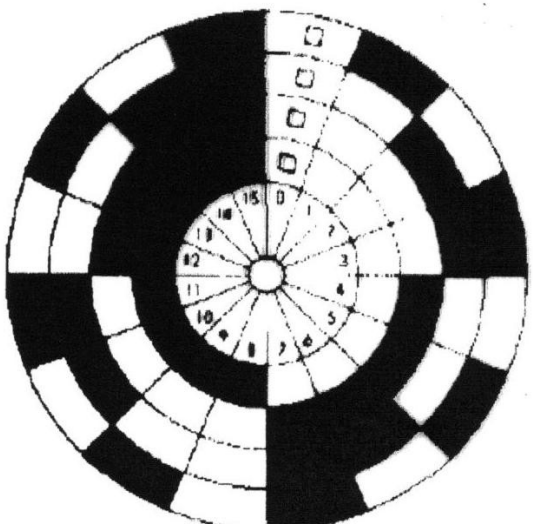
- Código Gray

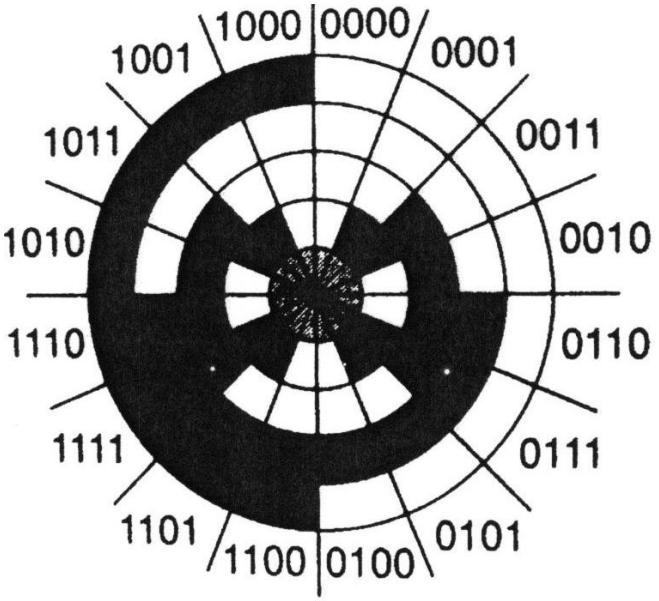
Código Decimal	Código de Gray								
	2 bits		3 bits			4 bits			
	A	B	A	B	C	A	B	C	D
0	0	0	0	0	0	0	0	0	0
1	0	1	0	0	1	0	0	0	1
2	1	1	0	1	1	0	0	1	1
3	1	0	0	1	0	0	0	1	0
4			1	1	0	0	1	1	0
5			1	1	1	0	1	1	1
6			1	0	1	0	1	0	1
7			1	0	0	0	1	0	0
8						1	1	0	0
9						1	1	0	1
10						1	1	1	1
11						1	1	1	0
12						1	0	1	0
13						1	0	1	1
14						1	0	0	1
15						1	0	0	0



Códigos Especiais

- Código Gray





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Códigos Especiais

- Código BCD (Binary Coded Decimal)

```
  8     7     4
1000 0111 0100

  9     4     3
1001 0100 0011
```

```
0110 1000 0011
 6    8    3

0111 1000 0001
 7   Erro  1
```

$$137_{10} = 10001001_{2}$$

$$137_{10} = 000100110111_{BCD}$$

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Códigos Especiais

- Código ASCII
- (American Standard Code for Information Interchange)

Tabela 1.2

				Equivalente Hexadecimal															
b7 →				0	H	0	H	0	H	0	H	1	H	1	H	1	H	1	H
b6 →				0	E	0	E	1	E	1	E	0	E	0	E	1	E	1	E
b5 →				0	X	1	X	0	X	1	X	0	X	1	X	0	X	1	X
b4	b3	b2	b1	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
0	0	0	0	NUL	00	DLE	10	SP	20	0	30	@	40	P	50	`	60	p	70
0	0	0	1	SOH	01	DC1	11	!	21	1	31	A	41	Q	51	a	61	q	71
0	0	1	0	STX	02	DC2	12	"	22	2	32	B	42	R	52	b	62	r	72
0	0	1	1	ETX	03	DC3	13	#	23	3	33	C	43	S	53	c	63	s	73
0	1	0	0	EOT	04	DC4	14	$	24	4	34	D	44	T	54	d	64	t	74
0	1	0	1	ENQ	05	NAK	15	%	25	5	35	E	45	U	55	e	65	u	75
0	1	1	0	ACK	06	SYN	16	&	26	6	36	F	46	V	56	f	66	v	76
0	1	1	1	BEL	07	ETB	17	'	27	7	37	G	47	W	57	g	67	w	77
1	0	0	0	BS	08	CAN	18	(	28	8	38	H	48	X	58	h	68	x	78
1	0	0	1	HT	09	EM	19	)	29	9	39	I	49	Y	59	i	69	y	79
1	0	1	0	LF	0A	SUB	1A	*	2A	:	3A	J	4A	Z	5A	j	6A	z	7A
1	0	1	1	VT	0B	ESC	1B	+	2B	;	3B	K	4B	[	5B	k	6B	{	7B
1	1	0	0	FF	0C	FS	1C	,	2C	<	3C	L	4C	\	5C	l	6C	|	7C
1	1	0	1	CR	0D	GS	1D	-	2D	=	3D	M	4D	]	5D	m	6D	}	7D
1	1	1	0	SO	0E	RS	1E	.	2E	>	3E	N	4E	^	5E	n	6E	~	7E
1	1	1	1	SI	0F	US	1F	/	2F	?	3F	O	4F	_	5F	o	6F	DEL	7F

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